UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Utilities Service

**BULLETIN 1780-2**

**SUBJECT: Preliminary Engineering Report – Water Facilities**

**TO:** Rural Development State Directors, RUS Program Directors, State Engineers

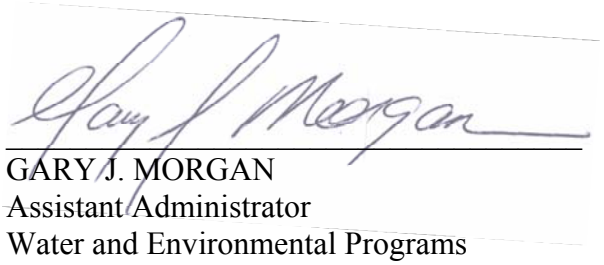
**EFFECTIVE DATE:** Date of approval.

**OFFICE OF PRIMARY INTEREST:** Environmental and Engineering Staff, Water and Environmental Programs

**INSTRUCTIONS:** This bulletin replaces previous RUS Bulletin 1780-2.

**AVAILABILITY:** This bulletin is available on the Rural Utilities Services' website at www.usda.gov/rus/water.

**PURPOSE:** This Bulletin provides applicants and their consultants with instructions on how to prepare a Preliminary Engineering Report for a water system application.



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*September 10, 2003*
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Application Document
Preliminary Engineering Report
Project Planning
Water Facility


## ABBREVIATIONS

O&M – Operations and Maintenance
PER – Performance Engineering Report
RUS – Rural Utilities Service

## 1 GENERAL

A Preliminary Engineering Report (PER) should clearly describe the owner's present situation, analyze alternatives, and propose a specific course of action from an engineering perspective. The level of effort required to prepare the report and the depth of analysis within the report are proportional to the size and complexity of the proposed project. Rural Utilities Service (RUS) projects must be modest in design, size and cost, and be constructed and operated in an environmentally responsible manner. Pursuant to 7 CFR Part 1794, guidance in RUS Bulletin 1794A-602, "Guide for Preparing the Environmental Report for Water and Waste Projects", and the Agency's environmental State Supplement, the applicant shall perform the environmental review concurrently with the project engineering planning. This document must indicate that environmental issues were considered as part of the engineering planning. Information provided in the PER will be used to process the funding request, therefore completeness and accuracy are essential for timely processing of the application. Other outlines may be utilized, but the essential information must be readily identifiable. Contact the Rural Development office for further guidance. The following should be used as a guide for the preparation of PERs for RUS financed water systems.

## 2 PROJECT PLANNING AREA

Describe the area under consideration. The project planning area may be larger than the service area determined to be economically feasible. Service may be provided by a combination of central, cluster, or individual facilities. The description should include information on the following:

a Location. Maps, photographs, and sketches. These materials should indicate legal and natural boundaries, major obstacles, elevations, etc.

b Environmental Resources Present. Maps, photographs, studies and narrative. This section should provide information on the location and significance of important land resources (farmland, rangeland, forestland, wetlands and 100/500 year floodplains, including stream crossings), historic sites, endangered species/critical habitats, etc., that were identified in the applicant's environmental information (normally an Environmental Report) and that must be considered in project planning. A narrative summary with reference to the applicant's environmental submittal is adequate.

c Growth Areas and Population Trends. Specific areas of concentrated growth should be identified. Population projections for the project planning area and concentrated growth areas should be provided for the project design period (typically 20-years). These projections should be based on historical records with justification from recognized sources.

## 3 EXISTING FACILITIES

Describe the existing facilities including at least the following information:

a Location Map. Provide a schematic layout and general service area map (may be identified on project planning area maps).

b History. Provide a brief description of when major system components were constructed or renovated.

c Condition of Facilities. Describe present condition; suitability for continued use; adequacy of water supply; and, the treatment, storage, and distribution capabilities of any existing central facilities. Note the quantity of unaccounted for water. Also, describe compliance with Safe Drinking Water Act and applicable State requirements.

d Financial Status of any Existing Facilities. (Note: Owner will be submitting most recent audit or financial statement as part of the application package.) Provide information regarding current rate schedules, annual operations and maintenance (O&M) cost, other capital improvement programs, and tabulation of users by monthly usage categories for the most recent typical fiscal year. Give status of existing debts and required reserve accounts.

## 4 NEED FOR PROJECT

Describe the needs in the following order of priority:

a Health, Sanitation, and Security. Describe concerns and include relevant regulations and correspondence from/to Federal, and State regulatory agencies.

b System O&M. Describe the concerns and indicate those with the greatest impact. Investigate water loss, management adequacy, inefficient designs, and problem elimination prior to adding additional capacity.

c Growth. Describe the reasonable growth capacity that is necessary to meet needs during the planning period. Facilities proposed to be constructed to meet future growth needs should generally be supported by additional revenues. Consideration should be given to designing for phased capacity increases. Provide number of new customers committed to this project.

## 5 ALTERNATIVES CONSIDERED

This section should contain a description of the reasonable alternatives that were considered in planning a solution to meet the identified need. Documentation of alternatives considered is often a PER weakness. The following alternatives should be considered, if practicable: building new centralized facilities, optimizing the current facilities (no construction), interconnecting with other existing systems, and developing

centrally managed small cluster or individual facilities. These alternatives should be consistent with those considered in the environmental review. Mitigation measures necessary to avoid or minimize any adverse environmental effects must be integrated into project design. The description should include the following information on each alternative:

a Description. Describe the facilities associated with the alternative. Describe all feasible water supply sources and provide comparison of such sources. Also, describe treatment, storage and distribution facilities.

b Design Criteria. State the design parameters used for evaluation purposes. These parameters must comply with RUS design policies (7 CFR 1780.57) and state regulatory requirements.

c Map. Schematic layout.

d Environmental Impacts. Do not duplicate the information in the applicant's submittal of environmental information. Describe only those unique direct and indirect impacts on floodplains, wetlands, other important land resources, endangered species, historical and archaeological properties, etc., as they relate to a specific alternative. RUS must conduct an environmental assessment prior to project approval.

e Land Requirements. Identify sites and easements required. Further specify whether these properties are currently owned, to be acquired, or leased.

f Construction Problems. Discuss concerns such as subsurface rock, high water table, limited access, or other conditions which may affect cost of construction or operation of facility.

g Cost Estimates. Provide cost estimates for each alternative, including a breakdown of the following costs:

(1) Construction.

(2) Non-Construction.

(3) Annual Operations and Maintenance.

h Advantages/Disadvantages. Describe how the specific alternative meets the owner's needs with respect to financial, managerial, and operational resources. Explain how the proposal complies with regulatory requirements and existing comprehensive area-wide development plans. Explain how the proposal satisfies public and environmental concerns.

## 6 SELECTION OF AN ALTERNATIVE

a Present Worth (life cycle) cost analysis (an engineering economics technique to evaluate present and future costs for comparison of alternatives) should be completed to compare the feasible alternatives. All of the items from the cost estimate should be included in the analysis. The "real" federal discount rate from Appendix C of OMB Circular A-94 should be used for determining the present worth of the uniform series of O & M values (in today's dollars) and the salvage value. A 20-year real interest rate may be interpolated as the average of the 10-year and 30-year rates on the web page at: www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.

b A matrix rating system could be useful in displaying the information on each alternative.

c Note that if the range of present worth values is small, then non-monetary factors should be considered in determining which alternative should be selected.

## 7 PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

This section should contain a fully developed description of the proposed project based on the preliminary description under the evaluation of alternatives. At least the following information should be included:

a Project Design.

(1) Water Supply. Include requirements for quality and quantity. Describe recommended source, including site.

(2) Treatment. Describe process in detail and identify location of plant and site of any process discharges. Identify capacity of treatment plant (e.g. Maximum Daily Demand).

(3) Storage. Identify size, type and location.

(4) Pumping Stations. Identify size, type, location and any special power requirements.

(5) Distribution Layout. Identify general location of line improvements: lengths, sizes and key components.

b Total Project Cost Estimate. Provide an itemized estimate of the project cost based on the stated period of construction. Include development and construction, land and rights, legal, engineering, interest, equipment, contingencies, refinancing, and

other costs associated with the proposed project. The engineer may rely on the owner for estimates of cost for items other than construction, equipment, and engineering. (For projects containing both water and waste disposal systems, provide a separate cost estimate for each system.)

c Annual Operating Budget. Provide itemized annual operating budget information. The owner has primary responsibility for the annual operating budget, however, there are other parties that provide assistance. This information will be used to evaluate the financial capacity of the system. The engineer will incorporate information from the owner's accountant and other known technical service providers.

(1) Income. Provide a proposed rate schedule. Project income realistically for existing and proposed new users separately, based on existing user billings, water treatment contracts, and other sources of income. In the absence of historic data or other reliable information, for budget purposes, base water use on 60 gallons per capita per day, or 150 gallons per residential-sized connection per day, or 4,500 gallons per residential-sized connection per month. When large agricultural or commercial users are projected, the report should identify those users and include facts to substantiate such projections and evaluate the impact of such users on the economic viability of the project.

(2) Operations and Maintenance (O&M) Costs. Project costs realistically. Provide actual costs for existing systems and projected costs for operating the system as improved. In the absence of other reliable data, base on actual costs of other existing facilities of similar size and complexity. Include facts in the report to substantiate operation and maintenance cost estimates. Include salaries, benefits, water purchase, taxes, accounting and auditing fees, legal fees, interest, utilities, oil and fuel, insurance, annual repairs and maintenance, supplies, chemicals, office supplies, printing, and miscellaneous.

(3) Debt repayments. Describe existing and proposed financing from all sources. All estimates of RUS funding should be based on loans, not grants. RUS will evaluate the proposed project for the possible inclusion of RUS grant funds.

(4) Reserves. Describe the existing and proposed loan obligation reserve requirements for the following:

- Debt Service Reserve - Unless otherwise required by State statute, the debt service reserve should be established at one-tenth (1/10) of annual debt repayment requirement (amount of debt that must be repaid to government in a given fiscal year).

- Short-Lived Asset Reserve - Additional reserve amounts may be needed to provide for timely replacement of short-lived assets. Prepare a schedule of short-lived assets and a recommended annual

reserve deposit to fund replacement of short-lived assets, such as pumps, paint, and small equipment. Short-lived assets include those items not covered under O&M, however, this does not include long-lived assets such as a water tank or treatment facility replacement that should be funded with long-term financing.

## 8 CONCLUSIONS AND RECOMMENDATIONS

Provide any additional findings and recommendations that should be considered in development of the project. This may include recommendations for special studies, highlight the need for special coordination, a recommended plan of action to expedite project development, etc.